METEOROLOGICAL OFFICE NEWSLETTER

FOR

CLIMATOLOGICAL OBSERVERS

IN

ENGLAND AND WALES

NO 5

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Produced by:-

Met O 1
Observational Requirements
and Practices Branch
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Editorial

I have to report a marked shortage of letters to the Editor which I can only put down to either that all observers are still sunning themselves on the Costa Lot and their deputies are too hard pressed to write anything beyond the Weather Diary or else everyone is so happy that there is nothing to write about. Neither explanation seems very likely so perhaps someone could write in and tell me why they are not writing, or vice versa, if that is easier.

I had the pleasure of meeting a number of observers attending our courses at Shinfield Park recently and I also visited the stations at Lowestoft and Levington. Once again the dedication and application of everyone was apparent but I think this fact is well worth recording in these days of lowering standards. Clearly many people find observing the weather a very interesting occupation. It is worth making the point here, as I emphasise at Shinfield Park, that the value of a set of observations increases with the length of the period of that set. A 30-year term provides a complete picture of the climate and its daily, seasonal and annual variations at that place. A station nearby with a 10-year term will provide sufficient information to show differences from the 30-year station, and a 5-year term is enough to show some measure of comparison with a nearby longer-term station. The actual value is incalculable because such observations are used in analysis for a great variety of purposes such as planning for construction, transportation, power and other heavy industries. The simple and substantial saving in knowing when to add anti-freeze in mixing cement for an Empire State-type building or what is the highest gust over 30 years to be experienced at the Humber Bridge (or any San Francisco-type bridge) is huge in terms of community benefit but entirely dependent on the daily observations which have gone before as a day-to-day routine.

I am leaving the Office on retirement at the end of September and I wish you all the very best of observing for the future.

David Smith

METEOROLOGICAL OFFICE NEWSLETTER NO 5 (Met O 1a Contribution)

The activities of the Marine Division of Met O 1a may perhaps be divided into five main headings:

1. Administration of the Voluntary Observing Fleet and assessment of the observations with the object of making awards to the Masters and officers who have maintained the highest standard of observing throughout the year,

2. The operation of the United Kingdom Ocean Weather Ships,

3. Ship Routeing Service,

4. Services for marine activities,

5. Response to marine enquiries.

The main activity is the administration of the Voluntary Observing Fleet, over 500 ships whose officers voluntarily make and transmit six-hourly surface observations during the normal course of their voyaging throughout the world. The local contacts for these vessels are our seven Port Met Officers who are based at the seven main ports in the United Kingdom.

The section is responsible for the operation of the two United Kingdom vessels which form part of the North Atlantic Ocean Station scheme, whose object is to maintain vessels at selected positions in the North Atlantic on a continuous basis, making hourly surface reports and six-hourly upper air observations. These vessels are based at Greenock on the Clyde and are ex Castle class frigates, now refurbished and renamed 'Admiral Fitzroy' and 'Admiral Beaufort'.

Met O 1a is responsible for the administration and operation of a Ship Routeing Service which is staffed by Master Mariners who work in conjunction with the forecasters in the Central Forecasting Office in Bracknell. The object of the service is to advise shipmasters of the best routes to take to avoid adverse weather on North Atlantic and North Pacific passages. This is a chargeable service, the revenue from which has been steadily increasing over the past three to four years.

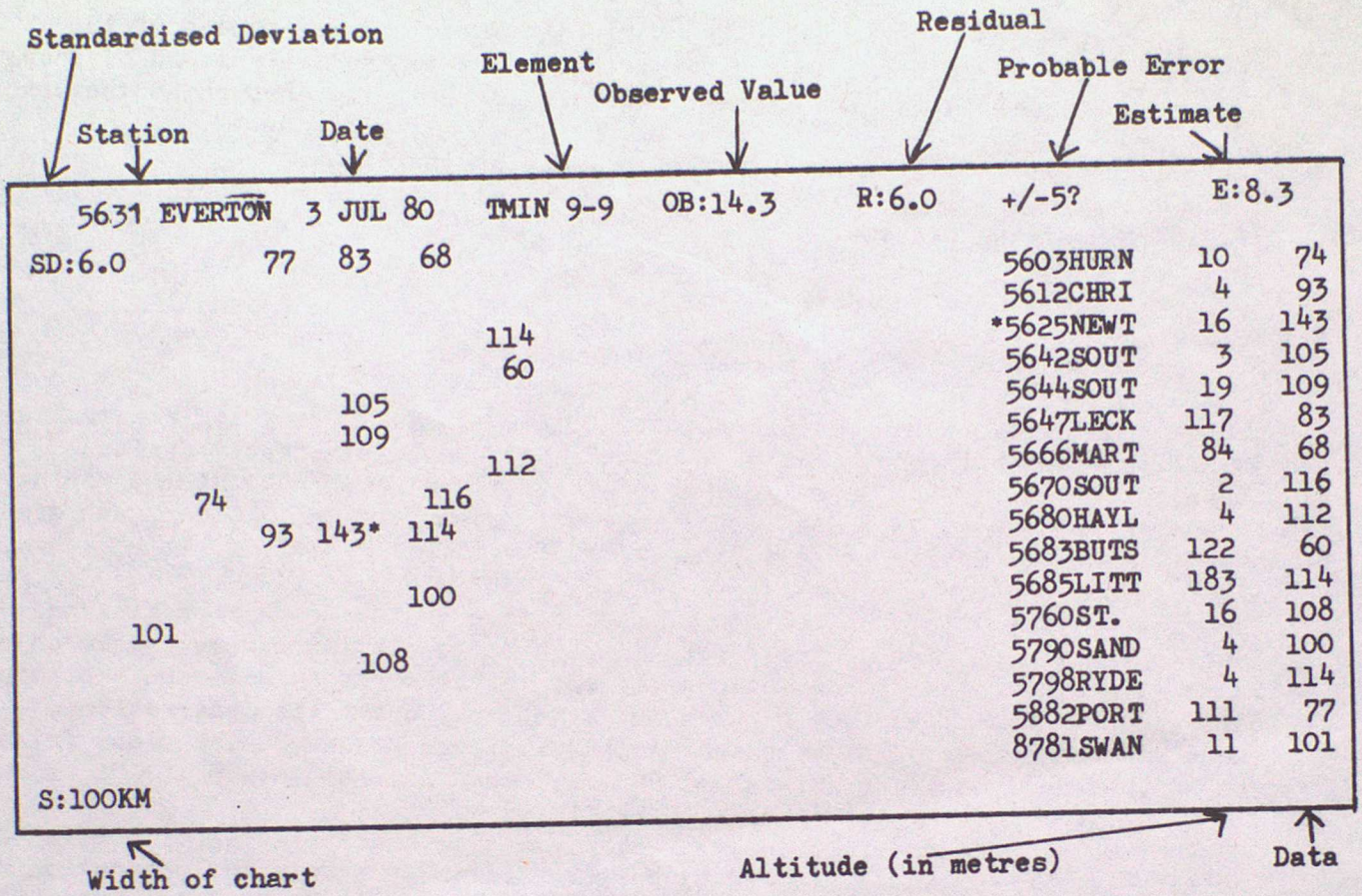
Met O 1a acts as the link between the Meteorological Office and the various media to ensure that the shipping and fishing industries are provided with the most appropriate general weather forecasting service, such as the shipping bulletins broadcast by the BBC and those transmitted from the GPO coastal stations.

Certain personnel in the section are fully occupied in answering enquiries of a marine nature, usually from solicitors, pending litigation in cases in dispute regarding recent passages of vessels where Owner and Charterer may disagree on the weather experienced.

CHECKING CLIMATOLOGICAL DATA

During the last year or so, the Climatological Research Group in Met O 3 (Climatological Services Branch) has developed a new method for identifying observations in the Meteorological Office Climatological Archive that may be in error. It is an improved and more sophisticated method of areal quality control in which each observation of a particular element is compared with those at nearby stations. The major improvement is that each suspect observation is plotted (by computer) at the centre of a small chart together with 10 to 20 of the neighbouring observations.

The map below is an example of the output. It shows that the Minimum Temperature for Everton (DCNN 5631) in Hampshire on 3rd July 1980 is estimated to have been 8.3 deg C rather than the archived value of 14.3 deg C (ie. a probable error of about 5 deg C) - the values are plotted in tenths of deg C.



The Standardised Deviation of 6.0 indicates that the observation is 6.0 standard deviations from the Estimate and almost certainly wrong. This is very quickly confirmed by visually inspecting the map and an amended value of 9.3 deg C would be suggested. In some places it is also very necessary to consider the topography in the region of the suspect observation as this may have an important influence in deciding whether the observed value may in fact be correct. It is usually found that data with Standard Deviations of over 4.5 are almost certainly wrong whereas those where it is under 3.2 rarely are in serious error. It requires a human to decide whether a value should be accepted or amended (and if so to what value) and sometimes the decision is not clear cut.

The presentation in map form makes it considerably easier than it was in the past (when suspect values were presented as part of computer tabulations) to make the necessary decision - perhaps in consultation with the observer. Maps are only printed for observations which are suspect. Six elements are checked this way - Maximum, Minimum, Grass Minimum, Dry and Wet Bulb Temperatures, and Sunshine Duration - and all values can be treated consistently. Data received within 3 weeks of the end of the month are tested; those received later have to be checked by more laborious and less precise manual methods.

The method relies on the statistical estimation of 16 coefficients for each day, to use with 15 factors previously determined for each particular station from data actually observed at 3-day intervals for the base period 1973-77 or, for new stations, estimated from more recent data. Thus the particular characteristics of each station are automatically taken in to account.

Those gallant souls who have read this far and who have limited mathematical knowledge should skip the rest of this article as it describes the method in rather more precise terms.

The technique, as you will already have gathered, involves estimating a value for the observation being checked from a set of 15 Factor Scores for each station and 16 coefficients for each day. The Factor Scores were obtained by Factor Analysis (using a Principle Components Analysis with Varimax Rotation) and the coefficients are determined by regression of the observations on the Factor Scores. The estimate is given by

$$T^*(s,d) = a_0(d) + a_1(d).f_1(s) + a_2(d).f_2(s) + \ldots + a_{15}(d).f_{15}(s)$$

where $T^*(s,d)$ is the estimated value for station s on day d

$a_i(d)$ is the coefficient of factor i on day d and

$f_i(s)$ is the factor score for the i'th factor at station s.

A residual, $R(s,d)$, is computed for each observation and compared with the mean residual for each Climatological District, $\overline{R}(s,d)$, and its standard deviation, $\sigma\ (R(s,d))$. By definition

$$R(s,d) = T(s,d) - T^*(s,d)$$

An observation is considered suspect if

$$\left| \frac{R(s,d) - \overline{R}(s,d)}{\sigma\ (R(s,d))} \right| > 3.25$$

- Edward A Spackman, Meteorological Office, Met O 3, Bracknell, Berkshire.

Exposure

Many observers may have puzzled over the necessity for thermometers to be kept in that strange white box on legs known as a thermometer screen, with the door opening to the north.

When temperatures are quoted as being the highest or lowest, it is the temperature of the air that is given. The thermometer screen, because of its double-louvred sides and ventilated floor protects the thermometers from solar radiation and allows the air to flow through freely. The thermometers inside will then register the temperature of the air that is passing through. The thermometers at a height of 1.25 m above the ground. This is the standard exposure for screen thermometers. When all thermometer screens are exposed in the same way we are then able to compare like with like.

A thermometer hung on a north facing wall may appear to satisfy exposure requirements by being unaffected by the sun's rays. If it is a house wall it may be affected by central heating; there may be differences between the reaction of brick and concrete or some other influences which are not already known. In other words there would be too many variables to be taken into account but with the thermometer screen these variables are eliminated, provided the basic exposure standards are observed.

Exposure standards are laid down to achieve reliable results from all the instruments. However there would be little point in having a well laid out enclosure with the screen at the correct height and the door opening to the north only to find it closely surrounded by trees or buildings. The effect would be adverse for all the instruments in the enclosure. For that reason the distance of the instruments from any obstruction should be at least twice the height of that obstruction.

- Desiree Allen

Admin Notes

As the costs of maintaining a climatological station and replacing equipment and instruments become an increasingly heavy financial burden, it may be timely to stress the need for stations to check all meteorological equipment before the onset of winter. One item of equipment which is most likely to repay attention is the thermometer screen, especially if we bear in mind the present cost of replacement:-

Large Screen	£376.07)	plus VAT
	)	and
Ordinary Screen	£219.25)	packing costs

If the paint on the screen is cracked or has started to peel off, rub down the woodwork with glass paper and ensure all surfaces are sound. Apply one undercoat followed by a finishing coat of hard gloss paint of exterior quality.

If the screen was re-painted last year, then a single coat of gloss may be enough, but each course of treatment will depend on the condition of the screen.

News of Stations

We are sorry to have to report the closure of the following stations since our last issue:

Station	Authority
Cartmel	Private
Herne Bay	Southern Water Authority
Littlehampton	Borough Council
Moor House	Nature Conservancy Council
Plymouth Hoe	City of Plymouth
Todmorden	School
Scole	Private

The station at Shinfield (NIRD) was moved to Arborfield but is still under the same authority, the National Institute of Research in Dairying.

The Meteorological Office at Kew closes at the end of the year, but we are already receiving reports from the newly opened climatological station at the Royal Botanic Gardens, Kew.

- G W Swift

Editor of the Newsletter
David Smith Esq
Met O 1

25.4.80

Dear Mr Smith

"White Dry Rain"

I was surprised that, in Fred Landon's article under the above heading in Newsletter No 4, no mention was made of the method that I have always used - and I think is used by many other observers - of obtaining the water equivalent of snow. That is the wrapping round the outside of the gauge of a cloth dipped frequently in a bucket of hot water. There can be no possibility of error in the "deduction" of added warm water and if the melting is done frequently there is no necessity to take core samples. If necessary when snow is falling heavily, I melt the funnel contents every hour throughout the 24 hours or, as on two occasions last winter, even more frequently. Having the station in my own garden enables me - with the help of an alarm clock to do this. The poor observer who requires Land Rover and skis to reach his site could certainly not!

I find the Newsletters most interesting.

Yours sincerely

S F WHITAKER
SHEFFIELD (DORE)

Dear Mr Whitaker

The method you describe to melt snow in the raingauge - a warm flannel - is certainly one of the methods given in the Observers Handbook Page 144. I must admit that it is not a method I have found to be effective at the stations where I have completed observations. This has been due to the raingauge being some distance from a source of hot water.

I believe the other two methods are quicker to carry out and in bad weather this makes these methods more attractive. During periods of continuous snow one also needs to carry out the melting quickly to enable the precipitation to be allocated to the correct period.

As I mentioned in my article I am continually impressed by the enthusiasm of our co-operating observers and your efforts in these trying conditions are truly praiseworthy. Please continue to use the method you find most suitable for your station. Your method is obviously a very accurate way to measure rainfall equivalent.

Fred Landon

Mr D Smith
Editor
"Newsletter for Climatological Observers"
Met O 1

26.4.80

Dear Mr Smith

GRASS MINIMUM/AIR MINIMUM TEMPERATURES

I, too, have been interested in the correspondence on the above subject, and would agree with Mr Hills' explanation (Issue No 3). When circumstances occur such as Mr Hill describes, the grass minimum will indeed read higher than the screen minimum. However, when I duly record these occasions, Met O 3a inform me that the readings are incorrect, which I dispute.

Yours sincerely

Alan Hunter
Met Observer SILSOE

Ed - Met O 3a please note

Weather in the United Kingdom

January - July 1980

The first day or two of January were cold everywhere with widespread night frost but on the 3rd there was a rapid change to mild conditions. The change was so marked that in many areas the lowest minimum temperatures of the month were recorded on the 2nd followed by the monthly maxima on the 3rd; for example, at Tregaron in South Wales a minimum of -9.0°C on the 2nd was followed by a maximum of 10.2°C on the 3rd. Colder weather returned to most areas after a few days and, apart from brief milder spells in southern areas, temperatures remained mostly a little below average for the rest of the month. There were no persistently snowy spells during the month, although snow was quite heavy locally on one or two occasions; on the 14th a level depth of 15 cm was recorded at Watnall in Nottinghamshire. Monthly mean temperatures were above average everywhere in February but northern areas were cold with some snow in places during the first week. On the 17th temperatures in many areas reached at least 13°C and over England and Wales as a whole it was probably the mildest February since 1961. Many districts, particularly in northern England and southern Scotland, were very dull with less than 50 per cent of normal sunshine for the month. The weather during March was mostly unsettled with more than twice the normal rainfall in many parts of the United Kingdom. A cold spell occurred in mid-month with moderate or heavy snowfall in some areas. There were also severe gales at times, particularly in south-western districts, on the 7th and again on the 28th and 29th.

In sharp contrast to the previous month, April was unusually dry with very few places in the United Kingdom recording more than 50 per cent of normal rainfall and many places in south-west Scotland, north-west England, North Wales and the Channel Isles recording less than 10 per cent. At the Manchester Weather Centre only 0.9 mm of rain fell and at Ruthin in Clwyd only 1.1 mm was recorded. Between the 13th and 16th the weather became very warm in many districts, the temperature rising to 23.0°C at Santon Downham (Norfolk) on the 16th. Although eastern and south-eastern parts of England were cold at times, temperatures in

other areas then returned to nearer the normal for the rest of the month. The weather at the beginning and end of May was rather unsettled but in the middle of the month there was a prolonged dry, sunny spell in most districts. However, night frosts occurred in places; at Kew on the night of 8th/9th the air temperature fell to -3.1°C and the grass minimum to -10.6°C. It became very warm by day and on the 12th and 13th maxima of at least 26°C were recorded at places in England, Wales and western Scotland. The weather during June was very unsettled and often thundery. Rainfall was well above average in most areas and over England and Wales as a whole it was probably the wettest June since 1912. It became very warm on the 4th with temperatures exceeding 28°C in many places but on the 5th violent thunderstorms occurred in many western, central and northern areas of Britain; 3 people were killed by lightning and flooding was reported in several districts. The remainder of the month was generally cooler with further outbreaks of heavy rain or thunderstorms at times; at some places in East Anglia thunder was reported on as many as 10 days during the month.